CLAIMS

1. A multimodal polyolefin resin comprising not less than 80 weight % of ethylene and up to 20 weight % of one or more C_{3-10} alpha olefins, said composite resin having a density greater than 0.940 g/cm^3; a melt index determined according to ASTM D 1238 under a load of 2.16 kg and a temperature of 190°C greater than 0.01 g/10 minutes, a polydispersity greater than 3.5, and a CDBI of greater than 50 comprising at least:

a) from 5 to 50 weight % of a high molecular weight component having a density greater than 0.940 g/cm^3; a weight average molecular weight greater than 250,000; a polydispersity from 1.5 to 3.5; and a short chain branch content from 0.0 to 4.4 short chains per 1000 carbon atoms in the polymer backbone; and

b) from 50 to 95 weight % of a lower molecular weight component having a density from 0.930 to 0.960 g/cm^3; a weight average molecular weight greater than 25,000; a polydispersity from 2.0 to 3.5; and a short chain branch content from 0.5 to 6.1 short chains per 1000 carbon atoms in the polymer backbone.

2. The multimodal polyolefin resin according to claim 1, having a melt index determined according to ASTM D 1238 under a load of 2.16 kg and a temperature of 190°C from 0.10 to 0.50 g/10 minutes.

3. The multimodal polyolefin resin according to claim 2, having a polydispersity greater than 5.

4. The multimodal polyolefin resin according to claim 3, which is a bimodal polyolefin resin.

5. The bimodal polyolefin resin according to claim 4, wherein the high molecular weigh component is present in an amount from 15 to 40 weight % based on the total weight of the resin.

6. The bimodal polyolefin resin according to claim 5, wherein the low molecular weight component is present in an amount from 85 to 60 weight % based on the total weight of the resin.

7. The bimodal polyolefin resin according to claim 6, having a CDBI from 70 to 95.

8. The bimodal polyolefin resin according to claim 7, having a density from 0.940 to 0.955 g/cm^3.

9. The bimodal polyolefin resin according to claim 8, having a melt index determined according to ASTM D 1238 under a load of 2.16 kg and a temperature of 190°C from 0.10 to 0.50 g per 10 minutes.

10. The bimodal polyolefin resin according to claim 9, having a polydispersity greater than 5.

11. The bimodal polyolefin resin according to claim 10, having a CDBI from 75 to 80.

12. The bimodal polyolefin resin according to claim 11, having a density from 0.945 to 0.950 g/cm^3.

13. The bimodal polyolefin resin according to claim 12, having a melt index determined according to ASTM D 1238 under a load of 2.16 kg and a temperature of 190°C from 0.10 to 0.40 g/10 minutes.

14. The bimodal polyolefin resin according to claim 13, having a polydispersity greater than 5.

15. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 1.

16. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 2.

17. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 3.

18. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least

2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 4.

19. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 5.

20. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 6.

21. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 7.

22. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 8.

23. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 9.

24. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 10.

25. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 11.

26. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 12.

27. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 13.

28. A polyolefin pipe having a hydrostatic design basis at 23°C of equal or greater than 1250 psi and a ductile–brittle failure transition of at least 2000 hours when measured at 80°C under a minimum hoop stress of 900 psi prepared from a composite resin according to claim 14.

29. The polyolefin composition according to claim 4, wherein the comonomer is selected from the group consisting of butene, hexene and octene.

30. The polyolefin composition according to claim 29, prepared using a solution polymerization process in a series or parallel of two or more reactors at different temperatures each of which is not greater than 250°C.

31. The polyolefin composition according to claim 30, wherein at least one reactor in said solution polymerization process uses a single site catalyst.

32. The polyolefin composition according to claim 31, wherein said solution polymerization process uses two reactors and single site catalysts are used in each reactor.

33. The polyolefin composition according to claim 32, wherein one reactor is operated at a temperature from 140 to 160°C and the other reactor is operated at a temperature of not less than 180°C.